Newsletter of the North American Mycological Association

THE MYCOPHILE

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President David Rust Re-Elected to New Term

I have been re-elected as NAMA President through 2018. In the past three years, we've changed some basics like regional boundaries, given the website a comprehensive makeover, and initiated online event registration. There are many more steps we can take to improve NAMA for our members and affiliated clubs.

We have new tools available through our web and member management system: calendar, surveys, message boards, blogs, elections, press releases and forms builders. With one year of this new system under our belt, it's time to implement a fuller range of these features.

As President, I need to turn over website management to someone new, especially now that the site redesign is complete. We also need participation by key NAMA members to add content to the site.

NAMA is an umbrella mycological organization. We have no basic information on the website about mushrooms. I'm looking to develop an extensive introductory section, including basic structures, ecology, identification, microscopy, etc. Another overdue item on the NAMA website is a section for Mycophagy, cooking and preparation methods, with lots of mushroom recipes! If you can contribute, please let me know.

I would like to see NAMA members take ownership of our discussion group and Facebook page. These are our go-to centers for discussions about NAMA, news, membership promotion and a clearinghouse for events. The narrative should be about NAMA; not focused on mushroom identification and promoting other groups. If you're not a member of these groups, join today and get involved!

We need a classy promotional video about NAMA. It's important to have tools in place to promote NAMA to prospective members. We can also use new media to build awareness of NAMA in the larger mycological community. In order to keep current with modern technology, I am also looking for development of an online series about NAMA programs, events, mushroom education, and current mycological research.

With our collective expertise, we can help all our affiliated clubs with forums online and at our annual forays about best practices, programs, how to put on a fair, insurance, forays, financial management, and most important: how to start a club.

Demand for human and pet poisoning mushroom ID has increased incrementally. We need to work more closely with the American Association of Poison Control Centers , the Canadian Association of Poison Control Centres, and the ASPCA Animal Poison Control Center to share information about toxic fungi.

I'm still looking for someone out there with fundraising experience who could help us design a better donor program.

(Continued on p. 3)

UPCOMING FORAYS & OTHER EVENTS

This section of **The Mycophile** is reserved for publicizing the annual forays of NAMA affiliated clubs and other events you may be interested in learning about. If you would like us to list your club's next big event, contact us with details you would like displayed here and send to Dianna Smith, editor of NAMA's bi-monthly newsletter: mycophile@namyco.org. See also http:/namyco.org/events/index.html about posting on our website.

January 22-24: All California Club Foray (ACCF) will be held in January 2016 by BAMS. Chief mycologist will be Judy Roger, a member of the Oregon Mycological Society. This event includes catered meals, comfy lodging, and mushroom hunts in the bountiful Jackson Demonstration State Forest near Mendocino. This foray is open to members of California mushroom clubs and NAMA members. More information and to register please visit http://bayareamushrooms.org/.

July 28-31: NEMF (Northeast Mycological Federation) Annual Sam Ristich Foray will be held at Fitchburg State University in central MA close to the NH border. Chief mycologist will be David Hibbitt of Clark University. Further details and registration will be available soon at the BMC website http://www.bostonmycologicalclub.org/NEMF2016.html and at NEMF.org.

August 18-21: Wildacres Foray (Note the August date - first time) Cost will be $240 per person, double occupancy. More details will follow in upcoming issues.

September 8-11: NAMA Shenandoah Foray located in the unique environment of the bio-regions of the Blue Ridge Mountains and the Shenandoah Valley of Virginia. We will be stationed at the Northern Virginia 4-H Center in Front Royal. http://www.nova4h.com/#landing. Registration opens Spring of 2016.

September-22-25: Annual COMA Clark Rogerson Foray located in Copake NY in the Berkshires at the intersection of NY, CT and MA. Check for updates and registration online at www.comafungi.org.

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Please welcome NAMA's new Executive Commiteee at large trustees for 2016.
• Bill Bynum, Connecticut Valley Mycological Society. Bill has been President of CVMS for several years and was foray chair for the 2015 NEMF foray held at the end of July.
• Cici Tompkins, Missouri Mycological Society, current club President
• Angelica Miller, NAMA Life Member and member of: Colorado Mycological Society, New Mexico Mycological Society, and Gulf States Mycological Society, member and past chair of the NAMA Finance Committee.

Sam Landes is our new Foray Committee Chair; Stephen Russell is our new Mycoflora Committee Chair.
I'm looking forward to NAMA 2016, September 8-11. The NAMA Shenandoah Foray will be located in the unique environment of the bio-regions of the Blue Ridge Mountains and the Shenandoah Valley of Virginia. Our location is the Northern Virginia 4-H Center in Front Royal, Virginia. I hope you can attend.

I appreciate the opportunity to serve a second term as President of NAMA. If you have ideas and want to get more involved, please contact me directly, by email at president@namyco.org, or by phone at 510.468.5014. NAMA has a wonderful array of experts and volunteers. Let's get our people resources together and create some fantastic new programs.

If you know areas of NAMA that need improvement, I'd like to hear about those as well. Let's all work together to build NAMA into an organization with a new purpose and mission.

David Rust, NAMA President

Webmaster and *McIlvainea* Editor Needed

If you're interested in becoming our Webmaster, please contact me at president@namyco.org .

We also need a skilled editor to work on our peer-reviewed journal, *McIlvainea*.

Please Renew Your NAMA Membership Today

A few weeks ago, Membership Chairperson, Steve Bichler sent you an email with instructions to log into our website to pay 2016 dues. As a member of the mycological community, you appreciate the benefits of belonging to NAMA. This year we've made dues payments easy through online member registration.

We are an umbrella group for 80 mycological societies throughout North America. With our combined resources, we hold an annual foray (next year in Front Royal, Virginia at the northern end of the Blue Ridge Parkway) that offers days of guided hunts and lectures. We publish The Mycophile, a terrific 24-page newsletter with information and articles about all things mushroom. NAMA is the best resource for mushroom cultivation, information on mushroom poisonings, mushroom cooking and preserving, and mushroom dyes and papermaking. We have an active discussion group for members, an informative website, and much much more!

We promote, pursue, and advance the science of mycology. We award an annual scholarship and we support citizen science through the NA Mycoflora Project.

Dues are only $25 for members of affiliated clubs and $30 for unaffiliated members. Sign up now to continue your member benefits all through 2016! Find out more at http://www.namyco.org/join.php.

To renew your membership: http://mms.namyco.org/members/renewal_req.php?org_id=NAMA.
Or look for an email sent a couple of weeks ago be Steve Bichler entitled "**NAMA Membership Renewal Notice". If you need a new invoice, or for more information, contact Steve Bichler at** membership@namyco.org.
Checks should be sent to:
Steve Bichler, NAMA Membership, 6018 Illinois Lane SE, Unit B, Lacey, WA 98513-3617.

NAMA 2015 PHOTOGRAPHY AWARDS

Photos of the winning entries to the 2015 NAMA Award for photography: **DOCUMENTARY CATEGORY**
Walt Sturgeon, 1st Place for photo of *Exsudoporus frostii*
Brian Looney, 2nd place for *Hygrocybe cuspidata*
Three Foragers, 3rd place for *Boletus morrisii*

Exsudoporus frostii by Walt Sturgeon

Hygrocybe cuspidata by Brian Looney

Boletus morrisii by The 3 Foragers

HONORABLE MENTION

Andrew Parker for *Hygrocybe camarophyllus*

Michael Beug for *Ramaria stuntzii*

Walt Sturgeon for *Hydnellum caeruleum*

Mark Bower for *Entonaema liquescens*

Hygrophorus camarophyllus by Andrew Parker

Ramaria stuntzii by Michael Beug

Hydnellum caeruleum by Walt Sturgeon

Entonaema liquescens by Mark Bower

Gary Lincoff Award for Contributions to Amateur Mycology*

The Gary Lincoff Award for Contributions to Amateur Mycology is given annually to recognize a person who has contributed extraordinarily to the advancement of amateur mycology. Its recipients have often extensively conducted workshops, led forays, written or lectured widely about mushrooms and identifying mushrooms, all on a national or international level.

Nominations for this award should include a description of the accomplishments the nominee has made in the field of amateur mycology.

A name alone is not a sufficient nomination; neither is a profile on a website.
The recipient must be living at the time of the award.
Nominees who were not selected to receive the award are automatically re-nominated for 4 additional years, after which the nominee's name has to be re-submitted, and it's up to the nominator to keep track of this.
Selection among nominees is made by the voting of past award winners, and the award includes a plaque and lifetime membership in NAMA.
Nominations are accepted until April 1st of the award year.

Send a single copy of a Nomination by mail or email to:

Gary Lincoff
Chair, NAMA Awards Committee
The New York Botanical Garden
2900 Southern Boulevard
Bronx, NY 10458-5126
Email: garylincoff@earthlink.net
*(The 'NAMA Award for Contributions to Amateur Mycology' was officially renamed in 2015 to recognize Gary Lincoff's past and ongoing impact in fostering amateur mycology).

The Harry and Elsie Knighton Service Award

The Harry and Elsie Knighton Service Award was established by the NAMA Board of Trustees to recognize and encourage persons who have distinguished themselves in service to their local clubs. It is named for the Knightons, whose efforts began the North American Mycological Association in 1967.

The annual award consists of a plaque; publicity for the winner and club in The Mycophile; a one-year membership in the organization; and registration, housing and foray fees for the next NAMA Foray.

Each year's recipient is selected by the three most recent recipients of the Award.
Every NAMA-affiliated mycological club may nominate one candidate whom it feels has performed meritorious service during the current or preceding year, which has to be described!
Unselected nominees are automatically re-nominated for two additional years.
Nominations are accepted until April 1st of the award year.

Send a single copy of a Nomination by mail or email to:

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Chair, NAMA Awards Committee
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Email: garylincoff@earthlink.net

"So, You Want to Host a NAMA Foray?"

By Sam Landes, NAMA's New Foray Chair

These were my approximate words to Charlotte Caplan over the phone in October 2104. I was calling from the NAMA Foray in Washington at Camp Arnold. Below, I am writing a bit about where the process went from there so that others can think well in advance about what is involved a national NAMA Foray.

Planning and hosting a national NAMA Foray is like being married. It is one of the most rewarding and most challenging experiences you can take part in. I, members from my club, the Mushroom Club of Georgia (MCG), NAMA and the NAMA Foray Committee had the pleasure of assisting the Asheville Mushroom Club (AMC) with the planning and putting on of the 2015 Blue Ridge Foray this past September in Black Mountain, NC.

Most national NAMA Forays get 18 to 24 months to pull everything together, from the initial idea to the finished event. AMC, under the skilled and patient guidance of Charlotte Caplan, graciously and bravely agreed to plan this years foray in under 11 months. How, you may ask, did they do it? With dedicated teamwork, thoughtful delegating and willingness to work hard. Those are just of a few of the vital components one needs to create a successful foray.

Once our group had decided upon a location and a date (and yes, we will remember to be more cognizant of the Jewish High Holidays), we began to hold organizing meetings. We agreed, from the beginning, that the NAMA Foray Committee would be in charge of inviting all the speakers and arranging all the programs during the day and evening. Jay Justice and I were the go to guys for sending out invitation s and picking the chief mycologist. We invited numerous presenters, some of whom had to turn us down, before we ended up with our final roster. Even with a final list, we had to still improvise as we had two speakers (with three speaking slots) cancel a few days before the foray began. One of our goals in choosing who we did was the desire to focus on the Southeast and the great mycological resources we have here.

The team that Charlotte recruited from AMC were all topnotch. Mike Hopping worked hard in obtaining permits, lining up vans and scheduling the daily forays. The job of planning the walks includes creating, printing and distributing collection slips, finding drivers, making sure that the drivers had the lists of who was riding with them and getting safety vests for everyone. One thing we tried this year was an online sign-up process for the forays. In years past there were often mad scrambles and long lines that created a little chaos. I know that not everyone was thrilled with the online procedure (that AMC president O'Connor designed) but for the most part it really expedited the whole venture. We ware still open to feedback but do acknowledge that the forays need to grow and change and that takes some experimentation.

Setting up an easy-to-use registration process is also vital. Alison Hayes did an awesome job creating documents that were comprehensive and clear. Not only did she have to confirm NAMA memberships, she had to do room assignments and deal with waiting lists and last minute cancellations. Having a person with both good bookkeeping and great computer skills is a must. She was able to talk with the folks from the Puget Sound Mycological Society, who hosted the 2014 foray, to get some of their input on the registration process. It is always good to talk with past clubs who have hosted.

Another area of the foray that people may not think too much about is the vendor's space. A large enough room that has power and can be locked is essential. The location needs to be near where participants will be gathering. Some years it is near the hall for the evening talks. This year was near the dining room so people passed the vendor's room three times a day. Robin Brooks did a nice job interacting with vendors and making sure their needs were taken care of while fitting within the parameters of the foray.

WHO'S IN A NAME?: *Collybia cookei*

By John Dawson (part 3 of a series)

The genus *Collybia*, formerly a large and diverse collection of species, has recently undergone a major taxonomic revision[1]. Consequently, only four species now remain within it, one of which, *Collybia cookei* (Bresadola) Arnold, is a small white mushroom that is parasitic on other mushrooms, especially species of *Russula*. (http://users.skynet.be/deneyer.mycology/ has superb color photographs of it in situ.)

Its specific epithet, *cookei*, commemorates the British naturalist Mordecai Cubitt Cooke (1825–1914), one of very few mycologists who have been the subject of a full-length biography[2] — and no wonder, for his life was extraordinary in several respects.

Born in the village of Horning, Norfolk, Cooke briefly attended a local school, but at age 10 was sent to live with a maternal uncle, a Baptist minister who ran a day school in his church. When he returned home three years later young Cooke was, he later wrote, well-grounded "in the rudiments of Latin, Greek, algebra, etc.", and had developed an interest in botany, fostered by his uncle's habit of sending him out to collect roadside plants, which he was then tasked to identify using books in his uncle's library.

Cooke's formal education was completed by 18-month's study at a commercial academy in a nearby village, where he learned the practical skills of surveying and bookkeeping. He was then apprenticed for five years to a draper in Norwich, whom he served primarily as a bookkeeper. His main interests, however, lay outside his work. Encouraged by his employer to take up bird-watching, he also was active in local choral and instrumental music groups, and sang and played the flute throughout his life.

At 20, aware of the limited economic prospects for a bookkeeper, he moved to London, where he worked as a clerk in a solicitor's office; and the next year he married a woman two years older than he, Sophia Elizabeth Biggs, whose two-year-old illegitimate daughter Annie came with her. The marriage endured until Sophia's death 51 years later, but was anything but conventional. To quote from the entry on Cooke in the Oxford Dictionary of National Biography,[3]

Cooke had no children with his wife, but from the age of seventeen Annie bore him three sons and a daughter. In 1871 [Annie] left Cooke to marry his step-second cousin, John Quincey Cubitt, but by 1875 had left Cubitt and returned to Cooke, bringing with her her young daughter by Cubitt. She then had two more sons and a daughter by Cooke, before finally leaving him about 1890.

Cooke's seven children were thus his wife's grandchildren! It was not an incestuous relationship, but it was certainly a most unusual ménage a trois.

A bout of illness caused Cooke to lose his clerkship, after which he moved briefly to Birmingham before taking up a position as junior master in a private, church-run school for poor children in the Lambeth district of London. He remained there from 1851–60, teaching the boys while his wife taught the girls, and it was during that period that his interest in mycology began. In 1859 he obtained a First Class pass in a governmental botany examination — his only formal academic credential in the sciences — and shortly thereafter began publishing prolifically on a wide variety of topics in natural history, including (besides fungi) algae, ferns, reptiles, pond life, spiders and mites. Cooke was a very successful popularizer, whose twentieth-century counterpart might be Herbert S. Zim.

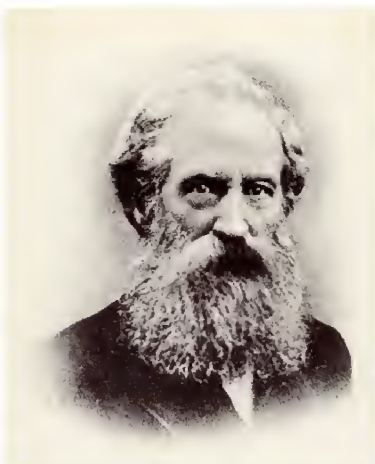
Relieved in 1860 of his teaching position, Cooke helped to catalog exhibits from New Zealand and India for the Great International Exhibition of 1862 and then worked for 18 years for the India Museum. In 1862 he also began a 27-year correspondence with M.J. Berkeley, founded the Society of Amateur Botanists, and published *Manual of Structural Botany*, followed the next year by *Index Fungorum Brittannicum*. Three years after that he published *Rust, Smut, Mildew and Mould*, founded the Quekett Microscopical Club (the second oldest microscopical society in Britain, still very active today), co-founded a popular science magazine, *Science Gossip*, and began publishing a series of *Exsiccati* (collections of dried fungi, mounted on loose pages that were gathered into sets , bound, and sold as books).

Cooke's two-volume Handbook of British Fungi appeared in 1871, and the following year he founded the technical mycological journal *Grevillea*, to which he contributed many important taxonomic articles. He became a corresponding member of several American natural history societies, was awarded an honorary M.A. by Yale University in 1873, and in 1880 "was seconded to the Royal Botanic Gardens, Kew, as its first cryptogamic botanist." There he "redoubled his mycological studies", one result of which was the publication, during the decade 1881–91, of the "monumental eight-volume *Illustrations of British Fungi*." His total published output comprised nearly 350 books and papers.

Throughout his life Cooke was acutely aware of his lower-class origins. Never financially well off, "he was ill at ease", despite his international reputation, "with the gentlemen scientists of his day", many of whom snobbishly regarded him "as a mere technician". In fact, Cooke was a dashing presence: an excellent speaker, writer and artist, he conducted an extensive correspondence with mycologists around the world, and was responsible for arranging the specimens in the mycological herbaria of both the Edinburgh Botanical Garden and the British Museum. His own herbarium and collection of fungal drawings were eventually sold to Kew, and his microscope to the Royal Horticultural Society.

In a few respects, Cooke was a reactionary: In the face of mounting evidence to the contrary, he never accepted that lichens were dual organisms, and he remained largely ignorant of fungal culture techniques. Nevertheless his impact on mycology was great, and toward the end of his life his contributions were recognized by the award to him of the Victoria Medal of Honor and the Linnean Society Gold Medal.

Besides *Collybia cookei*, Cooke's name was memorialized by the Italian mycologist Saccardo, one of Cooke's major correspondants, in the genus *Cookella*. Its type species, *Cookella microscopica*, grows on the underside of oak leaves — a habitat typical of those that Cooke investigated.



[1] For further details see Tom Volk's Fungus of the Month for June 2004 (http://botit.botany.wisc.edu/toms_fungi/jun2004.html)

[2] Mary P. English, Mordecai Cubitt *Cooke, Victorian Naturalist, Mycologist, Teacher and Eccentric* (Bristol, UK: Biopress Ltd., 1987). English, a distant relative of Cooke's, is herself a mycologist.

[3] Also by Mary English.

Newfoundland and Labrador crimped gills: *Plicatura nivea* & *Plicatura crispa*

By Henry Mann

Two of our most common wood decay mushrooms found on dead stems and branches of alder and other deciduous wood are the Crimped Gills. They can be found on almost every outing wherever alder grows; one is also found on birch and occasionally on other deciduous trees and shrubs. Some North American authorities, like Jim Ginns and Tom Volk, placed both in the genus *Plicatura*, as *P. nivea* (=*P. alni*) and *P. crispa*, although most European authors and many recent manuals still place the latter in the genus *Plicaturopsis*, as *Plicaturopsis crispa*. A preliminary analysis by Manfred Binder (personal communication) of the only *Plicatura nivea* nuclear sequence available, suggests the two belong to a single genus. For this reason we elect to follow Ginns and Volk in treating both as species of *Plicatura*. Greg Thorn has agreed to study this relationship in more detail, so stay tuned. The name comes from the Latin meaning folded or pleated, referring to the gills. *Crispa* also refers to the "curly" gills, and *nivea* means white, like snow. So, if we wished to provide common names for these two we might call them Snowy Crimped Gill and Curly Crimped Gill, possibly to the chagrin of serious taxonomists.

Both species form clusters of overlapping small thin brackets usually less than 2 cm across, each being fan-shaped with moderately lobed margins. Upper surfaces are velvety light brown to deep orange-brown, slightly zoned, and have a white margin. The underside spore producing surfaces are pale to white and have gills that appear as wavy vein-like folds that branch and curl. Crimped refers to these gills that produce a ridged, wrinkled or crinkled surface. The little brackets are soft and pliable when wet and tend to harden and curl under when dry, but rehydrate in rain or mist. Interestingly they are functionally true winter mushrooms as on any winter above-zero humid day they can quickly rehydrate and shed copious spores. Both species occur across the northern boreal zone in North America, Europe and Asia.

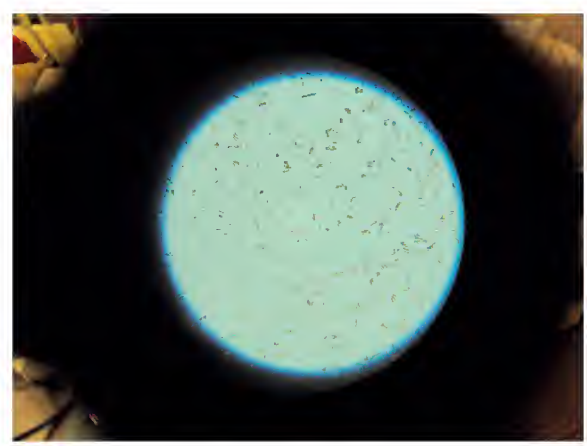
Once the two have been seen and examined with a hand lens, they can thereafter be readily identified with the unaided eye. The gill surfaces usually give the two away. In *Plicatura crispa* the wrinkly gills are more prominent and distinct, radiating outward from a lateral or central attached base and often have a pale greyish or bluish tinge. In *P. nivea* the gills are less distinct, without a fixed direction, and the whole surface appears wrinkled, crinkled and is snow-white. Its upper surface is usually a darker brown to orange-brown, and the fruit bodies are neither resupinate, nor do they fuse: they arise from separate rudimentary stalks—lateral or central attachments—and hang down like small bells. *P. nivea* is a paler light brown. It is often less shelf-like, growing flat, (resupinate) and

fusing into each other to produce a spreading plaque on the branch surface, with the white spore surface exposed and only the margins forming small shelves. Spores are similar in both, sausage or bean shaped, colorless (white), smooth and tiny, only about 4–5 µm long.

Although the crimped gills take on the habit and looks of brackets, they are not in the group traditionally known as bracket fungi (polypores, variously known as shelf fungi, bracket fungi or conks which normally have a porous spore producing surface). By their looks the crimped gills have been classified with true gilled mushrooms in the pleurotoid group (mushrooms with a habitus similar to genus *Pleurotus*: white spore print, a rudimentary or no stalk, usually placed off-centre [laterally], and fruiting on wood). Phylogenetically, *P. crispa* has been classified with flat corticiate species in a new order, Amylocorticiales, most of them fully resupinate.

Look for these two especially in the fall and throughout the winter. Bring the dry or frozen brackets home to a warm humid environment and watch them rehydrate to show their pretty features.

A. *Plicatura crispa* on birch twig, upper surface. B. Lower surface with crimped gills. Caps darker, with more contrasting colours. Fruit bodies remain separate, fixed from an individual central or lateral short stem, and on the underside the gill-folds radiate from that point. Even when crowded, the fruit bodies do not coalesce, and they are not resupinate, even at the underside of the branch. Gray colour of gills is typical.



C. *Plicatura nivea* on alder, its sole host. Caps more velvety, lighter and more evenly coloured, with a tendency to fuse. Lower fruit bodies coalesce and become resupinate. Gill-folds mostly directionless, colour white to cream. D. Spores of *P. crispa*. Spores of both species are alike: colourless, sausage shaped little rods, although reputedly the spores of *P. crispa* turn blue with iodine, whereas those of *P. nivea* remain colorless.

This article was first published in *Omphalina*, Vol. V, No 11, Dec. 15, 2014.

History of the Connecticut-Westchester Mycological Association (COMA)

By David Rose

Amateur associations to promote the study and appreciation of mushrooms began to thrive in metropolitan centers of the east coast beginning in the 1890s. The first were established in Boston, Washington, Philadelphia, and New York City and did much to focus interest in the fungi as an adjunct of botany. After the Great Depression and World War II a resurgence of this interest began to spread, consolidated by the North American Mycological Association (NAMA) in the 1960s. Amateur mycology as an organized part of nature study expanded further through NAMA-affiliated clubs and organizations. One of these was COMA, the Connecticut-Westchester Mycological Association.

First known as the Connecticut Mycological Association, the group was founded in 1975 by mushroom enthusiasts associated with the New York Botanical Garden (NYBG), New York Mycological Society, and Greenwich Audubon Center. The Nature Center for Environmental Activities of Westport, Connecticut was COMA's original sponsor. Ann and Bud Schwartz were founders and first directors, succeeded by Sandy Sheine in 1978 when the association's name was revised to include Westchester County. From its inception, COMA's primary goal has been to advance the science of mycology through public education, nature study, forays and field trips, publication, and lectures. As with many clubs, these activities encompass the fields of natural history, botany, taxonomy, culinary arts, photography, toxicology, and microscopy. The club promotes public education about mushrooms to prevent poisoning by toxic species and to foster understanding and appreciation of the world of fungi.

Thanks to a core group of dedicated mycophiles, COMA thrived and attracted talented people from all walks of life, from physicians and scientists to chefs who excelled in making cream of shaggy mane soup and a fellow who carved giant wooden mushroom replicas using a chain saw. Dr. Samuel Ristich (1915-2008) and Marge Morris (1918-2011) gave the very first educational talks to the club. Sam Ristich provided his myco-confreres the major inspiration for forming the club, as he did likewise in New Jersey and in Maine. Dr. Ristich, with his vast erudition and intellectual sparkle, was the mainstay of COMA and of amateur mycology in general in the northeast for several decades. Marge Morris came to COMA from the New York Mycological Society where she had served as "Co-Secretary (Field Trips)" in association with John Cage. An expert mushroom identifier, Marge was an exuberant participant in both NYMS and COMA.

When Sandy Sheine assumed the presidency of COMA in 1978, she had little idea that her role in that position would last twenty-two years. Sandy became a trusted leader because her care and concern for people equals her passionate devotion to mycology. She taught mathematics at Woodlands High School in Greenburgh, NY and studied mycology under Samuel Ristich, Clark Rogerson, and Gary Lincoff at the NYBG, where she volunteered as a laboratory technician under Dr. Rogerson and Dr. Gary Samuels. Sandy has long been a vigorous advocate and practitioner of public education and has served on the NAMA Education Committee since 1994; her special focus is children's education. In 1998, NAMA presented her its Award for Outstanding Contributions to Amateur Mycology. She and her husband Jerry Sheine have traveled the world in search of mushrooms, participating in volunteer projects such as the All-Taxa Biodiversity Inventory, in order to bring lessons learned back to COMA. In the second year of her COMA presidency (1979) she was pleased to announce a double honor to another key member of the club: Gary Lincoff had been elected President of NAMA and had just signed a book contract with Knopf to produce the *The Audubon Society Field Guide to North American Mushrooms.*

Gary Lincoff's association with COMA begins at Day One. His courses at the NYBG and countless presentations on mycology and botany potentiated the commitment and enthusiasm of COMA's mycophiles, and his 1986 lecture "The Wide World of Spores" inspired the title of COMA's newsletter, Spores Illustrated. His collaborative friendship with Sam Ristich and Sylvia Stein was legendary; as founding members of COMA these three catalyzed many others toward a deep, sustained focus in mycology. Sylvia Stein (1912-2001) lived her entire life in the Bronx. She turned to nature study as a summer counselor at Camp Williweemuck near Roscoe, NY. In the 1950s she began to study the fungi with her friend and fellow naturalist Eleanor Yarrow and joined the NY Mycological Society. Sylvia met John Cage and Lois Long at the NYBG and participated in forays with Mr. Cage at his home in Stony Point, NY. She served as Vice-President under Sandy Sheine, captivating audiences with her energetic lecture "In Search of Mushrooms" at the NYBG in the 1980s and 1990s. She was a regular lecturer at the Greenburgh Nature Center and the Cranberry Lake Preserve where she compiled annual collection lists of fungi. Sylvia and her husband Philip were sponsors of the Committee to Establish a Living Memorial to Eleanor Yarrow to create a self-guided nature walk at the NYBG in memory of Ms. Yarrow. In turn, COMA arranged for a woodland trail named in her memory at the Greenburgh Nature Center. In 1993 Sylvia received the Harry and Elsie Knighton Service Award for her outstanding contribution to amateur mycology

COMA Foray at the Hemlocks in Hebron Connecticut (about 1979). Photo by Sam Ristich

Thanks go to Sandy and Jerry Sheine for assistance in identifying the participants in each the four rows. All rows begin at the front and names of the individuals should be read from left to right. A question mark (?) means that the name of the person is not known.

Row 1: Marge Morris, Philip Stein, Aaron Halpern, Karin Rabin, Brenda Renhaw.
Row 2. Jean Paul Latil, Sandy Sheine, Sylvia Stein, Diane ?, (?), Roz Lowen, Joann Russell, Tommy Fox
Row 3: (?), Ursula Hoffmann, Jerry Sheine, (?) John Minot, Gerry Miller, Gary Lincoff, Tim Baroni, (?), Bunji Takawa
Row 4: Dave Patterson, Miriam Waitkins, George Waitkins, Roy Halling, Clark Rogerson, Gordon Fox

There are many devoted experts who contributed to the vitality of COMA for many years, including Roy Halling, Ursula Hoffman, Carol Levine, Roz Lowen, Vincent Marteka, Ray Fatto, and Barry Wulff. Dr. Clark Rogerson, an authority of the Hypocrealean fungi and curator of the mycological herbarium of the NYBG, served as scientific advisor to COMA from its founding to his retirement in 1996. In 1981, COMA named its annual foray in Dr. Rogerson's honor in appreciation of his devotion to amateurs. Another long-time member was Peter Katsaros (1926-2007), a court stenographer who became a photographer and expert field identifier of fungi and myxomycetes. His photos are prominent in The Audubon Society Field Guide to North American Mushrooms. Peter authored two popular guides, The National Audubon Society Pocket Guide to Familiar Mushrooms (1990) and The Illustrated Guide to Common Slime Molds (1989). Ed Bosman (1933-2007) was a founding member of COMA as well as its first cousin to the east – the Connecticut Valley Mushroom Society. A year after helping to start up COMA, he and Bud Schwartz, with members of the New Jersey Mycological Association, organized the first foray of the Northeast Mycological Federation (NEMF) at the Pocono Environmental Education Center in Pennsylvania in 1977. Since then, other local mycological clubs of the northeast have affiliated with NEMF to support the annual foray. Ed was the leading light of NEMF forays for three decades, incorporating the federation in Connecticut and serving as Secretary. He was an expert field identifier of mushrooms, with focus on the genus Tricholoma. He received NEMF's Eximius Award in 1975 and 2005 and the NAMA Award for Outstanding Contributions to Amateur Mycology in 1995.

COMA has maintained the tradition of holding its annual Clark Rogerson Foray as an extended four-day field trip, which Treasurer Donald Shernoff has expertly organized for two decades. The late summer excursion attracts mycophiles from far and near to excellent mushroom hunting sites in central Connecticut. As with all of amateur mycology, COMA transitioned into the digital age of the 21st century with a web site (www.comafungi.org) to afford increased interconnectivity via the World Wide Web to promote mycology. Former President Dianna Smith has used this to great advantage in disseminating digital photography of mushroom collections and educational videography of lectures and events. Another of Dianna's innovations is Mushroom University, an intensive winter workshop focusing on particular genera or groups of fungi led every year by Gary Lincoff beginning in 2008. Since Sandy Sheine's presidency, COMA presidents have included David Rose (2000-2005), Morrs Palmer (2006-2007), Dianna Smith (2008-2012), and Taro Ietaka (2013-2015). The current president is Joe Brandt

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Schizophyllum commune—split gills

By Sarah Graham

Schizophyllum is a genus in its own order, Schizophyllales, in the phylum Basidiomycota. The genus contains six wood-rotting species. *Schizophyllum commune* is a very common species worldwide; however, here in the province of Newfoundland and Labrador it is quite uncommon. In 12 years of forays we have not recorded it once, although it has been collected outside the foray [OMPHALINA 5(2):16, 2014].

Schizophyllum commune grows on wood with a shell-shaped cap fixed at a lateral point of attachment. The cap becomes wavy and lobed and is very narrow with a split edge, which becomes inrolled when wet. It is tough, felty and hairy to the touch, and becomes slippery when moist. It can grow up to 4 cm in diameter. It is a grayish white in color with pale reddish or gray gills that become split when dried out and appear closed when rehydrated. It is the only known fungus with gills that are split along their length that open and close, depending on varying levels of moisture. This feature gives the genus its common name, split gill (schizo=split, phyllum=gill).

Schizophyllum commune grows on hardwood and causes white rot, a very successful form of wood decay. It is known to colonize burnt wood after forest fires. Fruiting is predominately in the autumn. It is known from every continent except Antarctica where there is no wood to be used as a substrate.

Schizophyllum commune is listed as inedible and has been known to cause a few cases of human mycosis in people with a compromised immune system.

This article was first published in *Omphalina*, Vol. V, No 11, Dec. 15, 2014.

Alzheimer's disease

Fungus, the bogeyman

A curious result hints at the possibility dementia is caused by fungal infection

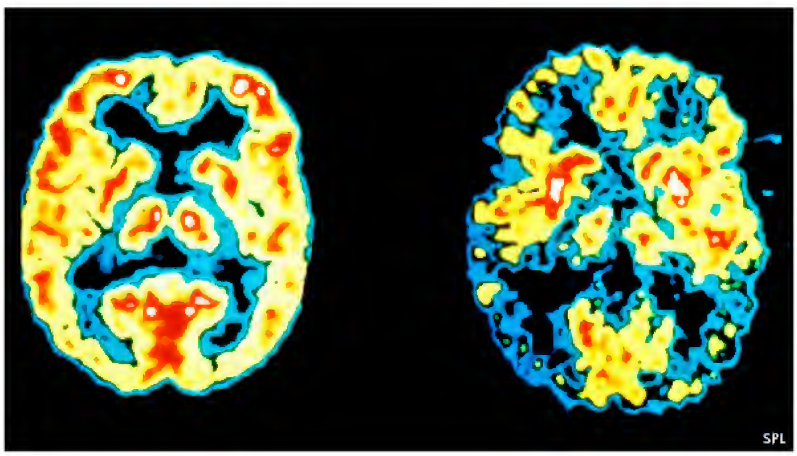
By Rebecca Morelle

Like cancers and heart disease, Alzheimer's is a sickness of the wealthy. That is because it is a sickness of the old. A study carried out in Spain in 2008 suggested that the risk of developing it doubles for every five years you live beyond 65. A richer world means a longer-lived world—and that, in turn, means a world which will suffer more and more from dementia. At least 40m people are thought to be affected by it already. The true number is likely to be higher, as many sufferers, particularly in the early stages of the disease, have yet to be diagnosed.

What actually causes Alzheimer's disease, though, is obscure. Workers in the field know that tangles and plaques of misshapen proteins play a big role. These accumulate in and between nerve cells, eventually killing them to create voids in the brain (see picture). It may be that the accumulation of these proteins is merely a biochemical ill to which human flesh is unfortunately heir, and which is a normal (if unwelcome) consequence of ageing. But some researchers doubt that, and are searching for external causes. There is evidence, in varying degrees, for everything from bacterial or viral infections, via head injuries to smoking. But a paper just published in Scientific Reports adds another possibility to the pot. A group of researchers led by Luis Carrasco of the Autonomous

University of Madrid, in Spain, have raised the idea that the ultimate cause of Alzheimer's is fungal.

Dr Carrasco and his team examined brain tissue from 25 cadavers, 14 of which belonged to people who had had Alzheimer's disease when alive. The other 11 (who had an average age of 61, versus 82 for the Alzheimer's sufferers) had been Alzheimer's-free. That may sound like a small sample from which to draw conclusions, but the signal the researchers found was overwhelming. Every single one of the Alzheimer's patients had signs of fungal cells of various sorts growing in his or her neurons. None of the Alzheimer's-free brains was infected.



Assuming Dr Carrasco and his team have made no methodological errors (and there is no suggestion that they have), then the question is one of causation. Do fungi usher in the disease, or does the disease usher in the fungi? An observational study like this cannot answer that question. But Dr Carrasco and his colleagues point out that what is known about Alzheimer's fits with what is known about fungal infections. Alzheimer's progresses slowly, as do untreated fungal infections. Alzheimer's patients exhibit signs of inflammation and an aroused immune system, which fungal infection might be expected to trigger. And the damaged blood vessels observed in many people with Alzheimer's fit with Dr Carrasco's observation of fungus growing in these vessels.

If fungal infection did turn out to be responsible for Alzheimer's, that would be excellent news. Medicine already possesses plenty of anti-fungal medications that could be raided to produce anti-Alzheimer's drugs. But Dr Carrasco's evidence, while intriguing, is far from conclusive. John Hardy, a neuroscientist at University College, London, points out that one (albeit rare) cause of Alzheimer's is well-understood. In a few unlucky families the disease appears to be an inherited disorder, caused by mutations of one of three genes. If a fungal infection were the ultimate cause, then those genetic mutations would have to make their carriers so susceptible that 100% of them end up infected, something he believes is unlikely. And the very clarity of Dr Carrasco's result also makes Dr Hardy suspicious.

If that result is right, though, it is still possible that the correlation runs the other way, with Alzheimer's opening the brain to fungal infection. After all, says Ian Le Guillou of the Alzheimer's Society, a British charity, the disease is thought to damage the blood-brain barrier, an immunological shield which keeps the brain safe from pathogens and toxins. The presence of fungi might merely reflect a greater susceptibility to infection.

Dr Carrasco and his team think a clinical trial of anti-fungal drugs is the next logical step. But there is yet another possibility. In the absence of a definitive ultimate cause, it may be that the symptoms of Alzheimer's disease can arise from many different types of insult to the brain. There have been several papers, says Dr Le Guillou, that have found correlations between various infectious organisms and Alzheimer's. "It could be a bit like the Mississippi river," says Dr Hardy. "You can start in all sorts of places, but eventually you're going to end up in New Orleans." If Alzheimer's is a general response to all sorts of neurological triggers then it may be that the fungal infections found by Dr Carrasco are simply one of a long list of causes.

From the *Economist* print edition of Oct 24th 2015: http://www.economist.com/news/science-and-technology/21676754-curious-result-hints-possibility-dementia-caused-fungal

Marine fungi reveal new branches on tree of life

Researchers have discovered several new species of marine fungi inhabiting previously undescribed branches of the tree of life

Researchers from the University of Exeter have discovered several new species of marine fungi inhabiting previously undescribed branches of the tree of life. Little is known about the fungi flourishing in the world's oceans and this study, which set out to investigate its diversity and abundance, revealed that many marine fungi are very different from those found on land.

The research, published in Proceedings of the Royal Society B, used large-scale DNA sequencing to describe the diversity of fungal microbes in a wide range of marine environments.

The study found a lower diversity and abundance of fungi in marine environments, suggesting that the majority of evolutionary diversification of fungi occurred on the land not in the sea.

Professor Thomas Richards from Biosciences at the University of Exeter said: "Compared to their land-based counterparts, little is known about the diversity and function of fungi in the oceans. We identified more than seventy marine fungi and in doing so we discovered several previously undescribed groups that are so genetically different from others we know of that they must represent highly unique branches on the tree of life."

Samples of marine fungi were taken from near the shore in six European locations across Bulgaria, Norway, Spain, Italy and France. Their genetic code was then mapped using large-scale DNA sequencing to understand how closely related they were to each other and to terrestrial fungi.

The results reveal the diversity and abundance of fungi in marine environments. They also help to build understanding of the evolution of these important microbes and shed light on how frequently fungi have transitioned from marine to terrestrial environments in the past.

The researchers believe that further sampling of fungi from different marine habitats, including those living on animals and algae, will reveal still more undiscovered species and help us understand what roles fungi play in the marine environment.

Story Source:
The above post is reprinted from materials provided by University of Exeter.
ScienceDaily, 18 November 2015. <www.sciencedaily.com/releases/2015/11/151118071007.htm>.
Journal Reference: T. A. Richards, G. Leonard, F. Mahe, J. del Campo, S. Romac, M. D. M. Jones, F. Maguire, M. Dunthorn, C. De Vargas, R. Massana, A. Chambouvet. *Molecular diversity and distribution of marine fungi across 130 European environmental samples*. Proceedings of the Royal Society B: Biological Sciences, 2015; 282 (1819): 20152243 DOI: 10.1098/rspb.2015.2243
Photo credit: © mark1987 / Fotolia

Taking you behind the scenes and into the laboratory of the Citizen Science Soil Collection Program

By Dr Robert H. Cichewicz
(a professor at the University of Oklahoma and leader of the Citizen Science Soil Collection Program)

For millennia, our ancestors turned to the Earth as a source of healing agents to address all manner of illness. For example, the Ebers Papyrus (written in the vicinity of Egypt around 1500 BC) provides hundreds of examples of medicinal plants and minerals used to treat many disease conditions including pain, vomiting, and infections. Fast forward to modern times and we see that the research methods used to study diseases have changed dramatically, but the idea that the Earth is the best source of lifesaving drugs has endured. The philosophy that our planet still holds many secrets to modern ailments is substantiated by a large and growing list of drugs that come from nature. Many of these medicines are made by soil-dwelling bacteria and fungi. Microbes have yielded a wide variety of important compounds (for example penicillin, statins, and cyclosporins originally come from fungi) for treating cancer and infections. But finding these beneficial dirt-dwelling microbes and turning them into life-saving medicines is not a simple task. It requires teams of researchers, as well as help from people such as you. A few weeks ago, I wrote a blog post inviting to you to be a part of this process and become a citizen scientist by sending us a soil sample from your backyard. We have had an overwhelming response to our requests, recieving thousands of samples which we are now processing through in the hope of discovering the next amazing secret that nature holds.

You might ask yourself, "What really happens after I send this sample?" or "How long does it actually take for you to discover something from what I send you?". In an attempt to answer some of those questions and tell you what happens behind the scenes, I decided to write this post.

Hop on and let me take you on a journey that turns a handful of dirt into a life-saving drug.

Step 1: From your yard to our lab
The journey begins when you request a free Citizen Science Soil Collection Kit from our lab. After you pick a favorite place in your yard, put a small handful of soil in the collection bag, seal it and drop the packet in your mailbox (we've already paid the return postage for you!). It takes less than 5 minutes, and did I mention it's free?

Step 2: Growing fungi from soil
Our hardworking team of students and researchers begin the process of isolating fungi from your sample. Most soils are teeming with several kinds of microbes including fungi – a great source of new and useful drug-like molecules. Even if you cannot see them, there are likely thousands in your sample. We spread the soil on the surface of a petri dish that is filled with a gel infused with fungi-food which include things like soil "tea," blended-up worms, simple sugars, and ground tomatoes – Yum!.

Soil samples spread on a petri dish to grow fungi
(Image Credit: C Coker, Cichewicz Lab

Step 3: Identifying fungal species using DNA sequencing
After growing and isolating the fungi in the soil sample, the next step is to identify new species using genetic sequence information. Hidden in vast landscape of the fungus' DNA there is a small stretch of genetic material known as the internal transcribed spacer (ITS). This fungal 'barcode' helps us distinguish between different species, identify new ones or categorize them into a larger group known as genera. It is estimated that somewhere around 5 million different fungi live on Earth, but only about 2% have been identified. Given these odds, you've probably had one or more new kinds of fungi living in your yard all along and never knew it!

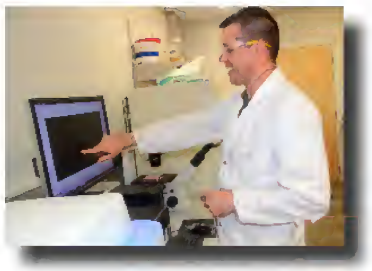
Thanks to the fantastic response to our outreach, we've received hundreds of samples, which is a good thing. But the sheer volume of samples we are dealing with means that growing and identifying fungi might take microbiologists a year or more to get your sample processed. But we won't keep you in the dark! We will be setting up a fungus photo album so you can see what fungi were isolated from your sample. Check out our website for updates!

Step 4: Extracting fungal compounds and testing them in different models of disease
Ultimately, it comes down to the chemistry that each fungus is making to help us determine if it has something 'good' that could help treat a disease. We grow the fungi on their favorite food – Cheerios breakfast cereal. As it turns out, Cheerios is not only a great food for toddlers, children, and adults, but fungi really like them too. We place Cheerios in test tubes along with the fungus and let it grow for several weeks allowing it to consume the cereal. The fungus is then extracted to remove its special compounds (the natural products) and these are stored in a freezer for later testing.

Fungi's favorite food? Why Cheerios of course! (Image Credit: C Coker, Cichewicz Lab)

One by one, the fungal compounds are tested for biological activity that might prove useful in a therapeutic setting. For example, we add the compounds to cancer cells to see if we can stop them from dividing or give them to pathogenic bacteria to try and stop their growth. The compounds are also entered into a collection that is tested when new disease targets become available. Growing the fungus and later extracting the compounds takes about two months but testing, conducted by our biology team can take as little as a few days or up to years to complete.

Step 5: Purifying the compound and finding its chemical structure
To figure out what the fungi are making, we grow them in large bags containing Cheerios. We then use chemical techniques to purify the desirable natural product away from all the other compounds in the fungal cells. Chemical structure determination then ensues. This step is rather similar to solving a big puzzle where we try and figure out the chemical makeup of the unknown substance. This is a highly variable step that might take weeks and sometimes many months to complete. Solving the structures of unknown compounds is fun, but it takes a lot of patience and the hard work of chemists in our lab.



Testing natural compounds against disease models in the laboratory (Image Credit: C Coker, Cichewicz Lab)

Step 6: Further testing purified natural product
We study the biological uses of the compounds, as well as share them with our collaborators, many of whom are pharmacologists trained in cancer and infectious disease biology. We work with a network of great scientists from around the country to try and determine the best use for the many new compounds from the fungi. This step can

take years to compete, but the good news is that we have many dedicated scientists ready and excited to test the new and amazing compounds from fungi.

It is truly amazing when you consider the lengthy and complex chain of events that unfold once you, a member of our Citizen Scientist Team, takes that first small step of sending in a soil sample. You never know what we may find or where we might find it. Despite all of these uncertainties, there is one thing that is undeniable – without you, we cannot hope to beat diseases like cancer and infections. So do not delay a second longer; request your Citizen Science Soil Collection kit today and join the fight. Or as we like to say, "Get your hands dirty. Make a difference."

Published in *Discover Magazine*, April 26 2015: http://blogs.discovermagazine.com/citizen-science-salon/2015/04/29/making-medicines-from-soil-behind-the-scenes-of-a-citizen-science-soil-fungi/

A Snippet: Who Invented Agriculture, the Ants or the Bees?

by Elio Schaechter

Agriculture was invented at the time of the dinosaurs, long before there was anything resembling a primate on earth. Take the example of the leaf cutting ants. For about 50 million years, they have been harvesting plant material, bringing it to their nest, chewing it up, and using the chewate to grow fungi, which is what they eat. Fittingly, their growth plots are referred to as "fungus gardens". Termites do similar things, except that their fungi are not eaten directly but are used to break down woody plant material. This makes them early-day biotechnologists, pioneers in the use of hydrolytic enzymes. The list of animal farmers is even longer and includes a number of other animals and sophisticated techniques. A notable one is that of marine snails that graze on fungi growing on the wounds that the snails themselves make on the leaves of marsh grass.

It turns out that bees now join the list of the farming insects - ants, termites, and beetles. Certain Brazilian bees also grow fungi, albeit for a specialized non-food purpose, to safeguard the food supply of their larvae. This is a new theme, preserving food by symbiosis. Lucky for the researchers, these South American Scaptotrigona social bees are stingless. They are so tame that in Brazil they are used as honey-producing pets, even in apartments of high rise buildings. A team of investigators from several Brazilian institutions has been studying the behavior of these bees discovered that their relationship to fungi is obligatory. No fungi, no bees.

Bees make cells out of cerumen (what we would call wax but is actually a mixture of wax and plant resins) for rearing their larvae, the so-called brood cells. Before depositing the eggs, the bees place within them a mass of semi-liquid food that is regurgitated by the workers and which serves as food for the larvae hatched from the eggs. The bees then cover the cells with a cerumen layer that is opened only when the adult bees emerge. What caught the investigators' eye is fungal growth in the brood cells. This starts about 3 days after the eggs are laid and ceases a few more days later. The fungus is an ascomycete mold of the genus *Monascus* that is used in East Asia for making various foods, mainly red rice and which makes a large number of bioactive compounds.

Suspecting that the fungus is eaten by the larvae, the researchers filmed the larvae in action. They saw them making circular swaths and chomping away at the fungal growth. But, they asked, is this kind of behavior obligatory? Larval food harvested form the brood cells was sterilized with UV light and reinoculated with the fungus. When the larvae were fed it, 76% survived, whereas only 8% made it on the uninoculated food. Moreover, the

mycelium and no spores (conidia) are ever seen, which suggests that the fungus is propagated by the bees. Trying to grow it from various parts of the bees and their nests, it was only found in the material used to make brood cells and the rest of the nest structures. However, mycelium could only be coaxed to grow out of such material when provided with the larval food. The cerumen is reused to make new brood cells, which leads ot the spread of the fungus to new structures. The investigators further surmise that the fungus resides in the bees' intestine and is spread from one to another by mouth-to-mouth feeding. This is not the way fungi are transmitted between ants, termites, and beetles. These use specialized structures found only in reproductive adults to carry the fungal material, whereas here it is the workers that do the transmission. This sort of horizontal transmission is news.

But what are the fungi for, given that these bees provide their larvae with what is likely sufficient food? There is no evidence as yet that the fungi are eaten for nutritional purposes, although it cannot be ruled out that the fungi provide some special nutrient needed for the development of the larvae. However, the experiment with re-inoculated food showed a huge difference between inoculated and control, beyond what one would expect form a purely nutritional effect. So, the reason why the larvae eat the fungus remains open. The alternative role for the fungi is to safeguard the larval food. It seems plausible because without the fungus the larval food rots away rapidly and smells bad in no time. Sure enough, the fungus produces compounds active against *Staphylococcus aureus* and *E. coli,* but only when fresh. Old fungus-containing larval food loses its antibacterial activity. The identity of these is not yet known but the leaf-cutting ants and a wasp are known to make antibiotics (or more precisely: their symbionts make them).

This work suggests that fungal activity is important in preserving the food for the larvae or perhaps to protect them from harmful parasites. Careful now with using fungicides compounds near or in bee colonies. This may mess around with an essential symbiosis.

Published in *Small Things Considered* http://schaechter.asmblog.org/schaechter/2015/11/a-snippet-who-invented-agriculture-the-ants-or-the-bees.html

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University of Toronto researchers discover mysterious fungus that defends against neighbouring bacteria

Researchers at the University of Toronto examined fungi in the mucus of patients with cystic fibrosis and discovered how one particularly cunning fungal species has evolved to defend itself against neighbouring bacteria.

A regular resident of our microbiome - and especially ubiquitous in the lungs of cystic fibrosis patients -the *Candida albicans* fungus is an "opportunistic pathogen." This means it usually leaves us alone, but can turn against us if our immune system becomes compromised. In fact, this fungus is among the most common causes of bloodstream infections, such as sepsis. As the population living with weakened immune systems has risen substantially over the past two decades - people living with HIV, having organ transplants or undergoing cancer chemotherapy are some examples - opportunistic fungal pathogens like this one have become an even greater threat. This is especially alarming considering we don't have any surefire anti-fungal drug to stop them.

"Fungi have a staggering impact on human health, infecting billions of people around the world and killing 1.5 million every year - that's in the range of tuberculosis and malaria," says Leah Cowen, lead researcher on the study, University of Toronto Molecular Genetics professor and Canada Research Chair in Microbial Genomics and Infectious Disease. "And yet, they are underappreciated and not well understood."

Candida albicans is a particularly wily fungus. Its signature maneuver is shapeshifting - it can morph from a round, single-celled yeast into a long stringy structure, allowing it to adapt to different environments and making it exceptionally harmful. For this study, researchers analyzed 89 mucus samples from 28 cystic fibrosis patients, using both high-throughput genetic sequencing as well as culture-based analysis. *Candida albicans* was predictably prevalent.

What surprised the researchers, however, was that some of this fungi began shifting into its stringy shape without any environmental cue - usually this transformation (called filamentation) doesn't happen spontaneously, but is triggered by the presence of certain substances, such as blood. To see if there could be a genetic explanation, the researchers sequenced the genomes of these samples and found a common denominator. All but one had genetic mutations in a gene known to repress the change shape - called NRG1.

"This was a smoking gun," says Cowen. "This gene makes a protein that stops filamentation - like a brake. Because of these genetic mutations, the fungi lost this brake and were not able to stop these long strings from forming."

To find out why certain strains of this fungus would have developed this genetic variation, researchers looked to neighbouring bacteria. As part of an ongoing battle between microbes, certain bacteria, which are also found in cystic fibrosis patients, secrete molecules preventing the fungus from changing into its stringy shape. The researchers tried exposing the mutated fungus to these bacterial rivals. Instead of responding to the bacterial signals, the fungus kept to its stringy form. The researchers believe these fungi have evolved to counter the tactics of their bacterial rivals.

"We think the interaction between bacteria and fungus drove this," says Cowen. "Usually losing control isn't a very good thing, but in this case it may be a great defense mechanism for Candida. These fungi have essentially learned to ignore the bacteria."

This study was published today in the journal PLOS Pathogens. It was part of a large interdisciplinary Canadian Institutes of Health Research grant, involving researchers across disciplines - clinicians, molecular biologists, evolutionary biologists and bioinformaticians collaborated on a variety of microbiome-focused studies.

Cowen is continuing research into the impact of fungal pathogens in cystic fibrosis patients, who are unable to clear microbes from their airways and suffer reduced lung function as a result. We still have no cure for this fatal genetic disease. She is also seeking to better understand the role of fungi in variety of other conditions.

Published in *News Medical: Life Sciences & Medicine*, November 21, 2015: http://www.news-medical.net/news/20151121/U-of-T-researchers-discover-mysterious-fungus-that-defends-against-neighbouring-bacteria.aspx

Editor's Note: In the previous issue of the *Mycophile*, this photo by Britt Bunyard is of Robert Rogers, author of *The Fungal Pharmacy*. Not having the pleasure of meeting him in person, I did not recognize him from the photo, and thus neglected to include his name. My apologies to all, especially Robert Rogers.

NAMA 2016

SHENANDOAH FORAY

September 8-11 at Front Royal, VA

Save the date to join friends new and old in September for NAMA's Shenandoah Foray in the Appalachians. We will be at the Northern Virginia 4-H Center, just minutes from Shenandoah National Park and the Appalachian Trail.

Registration opens in May!

Hosted by
The Mycological Association of Washington
&
The New River Valley Mushroom Club

Chief Mycologist: Walt Sturgeon

Walt Sturgeon is a well-known field mycologist and co-author of *Waxcap Mushrooms of Eastern North America*, *Mushrooms and Macrofungi of Ohio and the Midwestern States* and *Mushrooms and Other Fungi of the West Virginia High Country*.

Virginia is for mushroom Lovers

North American Mycological Association
Steve Bichler
6018 Illinois Lane SE, Unit B
Lacey, WA 98513-3617

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Newsletter of the North American Mycological Association
THE MYCOPHILE

Mushroom of the Issue

Psathyrella connisans Photo and text by Bill Bakaitis

Psathyrella connisans (Pk.) Smith 1972 is a small LBM mushroom which at first glance might be mistaken for a *Clitopilus or Psilocybe,* which in fact were Peck's original determinations in 1888 and 1908. In all respects but one it currently sits comfortably within the field characteristics typical of *Psathyrella*: The unusual striking characteristic, which is diagnostic, is the color of its spore print;a pinkish-cinnamon red, rather than the typical purplish brown to black *Psathyrella* print. In young to developing specimens there is usually a reddish cast to the entire cap, the thin flesh and attached gills. The cap fades to light buff in age. The white stalk is hollow. Inasmuch as this mushroom fruits in clusters it is quite common to find a spore deposit on the top of a neighboring cap. *P. conissans* is most commonly confused with the similar *P. bipellis* (Quél.) A.H. Sm. 1946 (= *P. barlae*) but *bipellis* produces the typical darker spores.

The specimens shown here were photographed on three year old wood-chip mulch near Millbrook NY in mid-December of this unusually mild Autumn.